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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/572,643	03/20/2006	Hiroyuki Mochizuki	127380	4777

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EXAMINER

CROUSE, BRETT ALAN

ART UNIT	PAPER NUMBER
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1786

NOTIFICATION DATE	DELIVERY MODE
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05/13/2010

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

OfficeAction25944@oliff.com
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Office Action Summary

Application No.

10/572,643

Applicant(s)

MOCHIZUKI ET AL.

Examiner

Brett A. Crouse

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1786

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 December 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) 5 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 6-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SI/22)
- Paper No(s)/Mail Date _____

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 22 December 2009 has been entered.

Status of Claims

2. The amendment, filed 22 December 2009, amends claims 1-5 and adds new claim 14.
3. Claims 1-4 and 6-14 are under consideration.

Specification

4. The disclosure is objected to because of the following informalities:
In instant example 3 of the specification on page 15, line 11. The dopant is recited as PBT. Later in the example page 16, line 9, PBD is recited as the vaporization source with regard to element 240.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

5. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1-4, 6-14 are rejected under 35 U.S.C. 102(e), as being anticipated by Yu et al., US 7,098,060.

Yu teaches:

Column 4, line 42 through column 5, line 26, column 5, lines 41-56, figures 1, 2, teaches an electroluminescent device.

Column 5, lines 27-40, teach the distribution of dopant in the polymer layer can be uniform or non-uniform. The passage additionally teaches the dopants are diffused in the polymer.

Column 6, lines 9-25, teach the dopant distribution in the polymer layer is readily tuned to optimize emission and device performance.

Column 6, lines 26-49, teach the diffusion of dopants into the polymer layer.

Column 7, line 59 through column 8, line 9, teach a polymer buffer layer. The polymer can be doped or undoped. The passage teaches various deposition methods.

Column 8, lines 10-57, teach various polymer hosts such as poly(paraphenylenevinylene), polyphenylenes and polyalkylthiophenes. The passage also teaches various dopants for the polymer hosts including PBD.

Column 8, line 58 through column 9, line 13, figure 3, teaches an electron injection/transport layer. The layer can comprise conjugated polymers, various small molecules and combinations thereof.

Column 11, lines 26-57, example 2, teaches vapor deposition and diffusion of a coumarin green fluorescent dopant into a layer of a poly(p-phenylene) derivative.

Column 13, lines 21-51, examples 7 and 8, teach electroluminescent devices having various fluorescent and phosphorescent dopants diffused therein.

7. Claims 1, 2, 6-10, 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Tang et al., US 6,066,357, with further evidence provided by Tang et al., US 4,769,292.

Tang teaches:

Column 7, line 44 through column 8, line 39, figure 5, teach an electroluminescent device structure.

Column 8, line 60 through column 9, line 7, column 9, lines 23-32, figures 6 and 7, teach vapor deposition of the dopant and diffusion of the dopant into the polymer layer.

Column 9, line 66 through column 10, line 16, figure 8, teach vapor deposition of dopants which emit red, green and blue light and subsequent diffusion of the dopants into the polymer layer.

Column 10, lines 33-46, claim 8, teach various preferred classes of dopants including coumarins and perylenes.

Column 8, lines 5-11, claim 4, teaches various host polymers including polyparaphenylene, polyparaphenylene vinylene and polythiophene.

Tang et al., US 4,769,292 as further evidence (incorporated by reference into US 6,066,357):

Tang '292 teaches perylene as an electron transporting material.

8. Claims 1, 2, 3, 4, 6, 7, 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Seo, US 2002/0028349.

Seo teaches:

Paragraphs [0032]-[0035], teach techniques for forming a doped polymer layer. The techniques include contacting the polymer with a dopant material in the vapor phase. The passage additionally teaches the various doping techniques such as chemical doping and electrochemical doping are substantially equivalent to the diffusion of dopant molecules. Paragraphs [0031], [0039]-[0040], [0068], teach the use of doped polymer layers as charge transport and light emitting layers. Paragraph [0069], teaches the metal containing polymer can be used as a hole or electron transporting material layer.

Paragraphs [0071]-[0075], teach various electron accepting and electron donating dopants.

Paragraphs [0084]-[0091], [0092]-[0099], embodiments 1 and 2, teach an electroluminescent device having a doped polymer layer as the light emitting layer.

Paragraphs [0100]-[0104], embodiment 3, teach an electroluminescent device having a doped polymer layer as a charge transport layer.

9. Claims 1-4, 6-14 are rejected under 35 U.S.C. 102(b) as being anticipated by Matsuo et al., EP 1,143,773.

Matsuo teaches:

Paragraph [0243], teaches various polymers for the organic layer including PPV. The passage additionally teaches the polymer can be mixed with hole or electron transporting materials.

Paragraphs [0168], [0237]-[0238], [0240], teach electron and hole transporting materials including oxadiazole derivatives.

Paragraphs [0146], [0159], teaches the polymer can have both charge transport and luminous materials therein.

Paragraphs [0135]-[0162], [0167]-[0174], teach electroluminescent devices, structure and materials.

Paragraph [0248], teaches that the luminescent dopant is preferably steamed after deposition. This is equated with diffused into the host polymer. The passage also indicates this is preferred in the techniques of examples 2-1 and 2-2.

Paragraphs [0255]-[0264], examples 2-1, 2-2, table 2, teach the preparation of electroluminescent device.

Paragraphs [0265]-[0269], example 2-4, table 2, teach as a comparative example the formation of the doped polymer layer by co-deposition from solution by spin coating. The device performance is compared with examples 2-1 and 2-2 and tabulated in table 2. The devices uses 2-(4-biphenyl)-5-(4-t-butylphenyl)-1,3,4-oxadiazole.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 1-4, 6-9, 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Samuel et al., US 6,313,261, in view of Matsuo et al., EP 1,143,773.

Samuel teaches:

Claim 1, teaches a light emitting device comprising at least two polymer semiconducting layers. The layers further comprise a hole transporting polymer layer and an electron transporting polymer layer. The claim further teaches that the electron transporting polymer layer additionally comprises a conjugated polymer.

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Claim 10, teaches various electron transport polymers. The passage also teaches the polymer can be doped.

Claim 13, teaches the hole transporting polymer can be a conjugated polymer. Various polymers are claimed including polyparaphenylene, polyparaphenylenevinylene derivatives and polythiophene derivatives. The passage also teaches the polymer can be doped.

Column 2, line 11, identifies phase separation as an issue of doped polymers.

Column 3, lines 25-29, teaches various deposition techniques including electro vacuum deposition processes.

Samuel does not recite:

Samuel does not recite diffusion of the dopant into the polymer layer.

Matsuo teaches:

Paragraph [0243], teaches various polymers for the organic layer including PPV. The passage additionally teaches the polymer can be mixed with hole or electron transporting materials.

Paragraphs [0168], [0237]-[0238], [0240], teach electron and hole transporting materials.

Paragraphs [0146], [0159], teaches the polymer can have both charge transport and luminous materials therein.

Paragraphs [0135]-[0162], [0167]-[0174], teach electroluminescent devices, structure and materials.

Paragraph [0248], teaches that the luminescent dopant is preferably steamed after deposition. This is equated with diffused into the host polymer. The passage also indicates this is preferred in the techniques of examples 2-1 and 2-2.

Paragraphs [0255]-[0264], examples 2-1, 2-2, table 2, teach the preparation of electroluminescent devices.

Paragraphs [0265]-[0269], example 2-4, table 2, teach as a comparative example the formation of the doped polymer layer by co-deposition from solution by spin coating. The device performance is compared with examples 2-1 and 2-2 and tabulated in table 2. The devices of examples 2-1 and 2-2 in which the dopant was diffused into the host polymer having a current efficiency of 2.5 times that of the device of example 2-4 in which the dopant was incorporated into the host polymer by co-deposition. The device uses 2-(4-biphenyl)-5-(4-t-butylphenyl)-1,3,4-oxadiazole as an electron transport material.

It would have been obvious to one of ordinary skill in the art to form the doped polymer layer of Samuel by the diffusion technique of Matsuo in order to achieve the improved device performance as suggested by Matsuo in the device of Samuel.

Response to Arguments

12. Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

Applicant argues unexpected results opposite the rejections of record and submits a declaration under Rule 1.132 in support of this assertion. This is not found persuasive as the rejections of Yu, Tang, Seo and Matsuo are applied under 35 USC 102. Attention is directed to MPEP 2131.04. Evidence of secondary considerations such as unexpected results cannot overcome a rejection under 35 USC 102. *In re Wiggins*, 488 F.2d 538, 543, 179 USPQ 421, 425 (CCPA 1973). The prior art references Yu, Tang, Seo and Matsuo provide a doped polymer layer in which the dopant can be provided to the polymer layer via diffusion.

Applicant argues Yu does not teach diffusion of the material into the polymer and points to column 11, lines 28-57. Attention is directed to the column 11, lines 26-57, example 2, which teaches vapor deposition and diffusion of a coumarin green fluorescent dopant into a layer of a poly(p-phenylene) derivative. Attention is directed to column 11, line 34 of the passage which teaches diffusion. Column 6, lines 26-49, also teach the diffusion of dopants into the polymer layer.

Applicant argues Tang does not teach diffusion of the material into the polymer and points to column 11, line 50 through column 12, line 13. Attention is directed to column 11, lines 57-60 of the passage which teach diffusion of the dopants into the light emitting layer. Column 11, line 63 through column 12, line 13 of the passage additionally teach diffusing the dopants into the light emitting layer and suitable materials.

Applicant argues Seo does not teach diffusion of the material into the polymer and points to paragraph [0033]. Attention is directed to [0034], as cited in the rejection, which teach the processes of Seo form an equivalent product to diffusion. The instant product claims are in product-by-process form. Additionally, attention is direct to paragraph [0034], of Seo which

teaches exposing the polymer to gaseous dopants and allowing the dopants to diffuse into the polymer

Applicant argues Matsuo does not teach diffusion of the material into the polymer and points to paragraph [0248]. Attention is directed paragraph [0248], which teaches the layer is preferably steamed after deposition. This is equated with diffusion into the host polymer. The passage also indicates this is preferred in the techniques of examples 2-1 and 2-2. The treatment of the layer by this technique is shown be Matsuo to provide improved device performance

Applicant argues opposite Samuel in view of Matsuo that the references alone or in combination fail to teach or suggest the diffusion of the dopant into the polymer layer. Applicant points to Matsuo paragraph [0248] as teaching vapor deposition. Attention is directed to paragraph [0248], teaches the layer is preferably steamed after deposition. This is equated with diffusion into the host polymer as noted in the rejection. The passage also indicates this is preferred in the techniques of examples 2-1 and 2-2. The treatment of the layer by this technique is shown by Matsuo to provide improved device performance.

The scope of the claims is not commensurate in scope with the breadth of the showing in the declaration. The scope of the claims does not restrict the pi-conjugated polymer or the dopant material beyond dyes and charge transport materials. The scope of the claims also does not provide any limitations to the temperature to which the devices are heated or for what length of time.

Additionally, applicant in the declaration provides comparative devices by the techniques of the prior art references.

Attention is directed to Comparative Example A1 which is directed to a spin coating technique. Applicant cites Yu as a source of teachings for the technique. Attention is directed to Yu, column 10, lines 27 through column 11, line 24, example 1, which provides the basic technique used in the subsequent examples of Yu. The example teaches the co-deposition of a dopant in a host polymer by spin coating from solution. The solvent of the example of Yu (toluene) is selected such that both the polymer and dopant are soluble. In the experimental example of the declaration the solvent is selected such that the polymer is not soluble. As such the experiment of the declaration does not follow the procedure of the prior art reference.

Attention is directed to Comparative Example A3 which is directed to a vapor deposition technique. Applicant cites Seo, Matsuo, and Tang as a source of teachings for the technique. Attention is directed to column 11, line 50 through column 12, line 13 of Tang as pointed to by applicant. The passage teaches on column 11, lines 64-68 exposing the dopant layer to fluid vapor to diffuse the dopants. This step was not been performed in the example of the declaration. As such, the comparative example of the declaration fails to follow the experimental procedure of Tang.

Similarly with regard to Seo a co-deposited layer such as in Seo is not formed by the comparative techniques of the declaration.

Similarly with regard to Matsuo a porous layer by the techniques of Matsuo such as examples 1 and 2 as cited in the office action is not formed nor is the device further treated with steam.

Similarly with respect to Comparative Examples A4 applicant does not form a doped layer and further removes the deposited layer by washing with acetone. As such, the comparative example of the declaration fails to follow the experimental procedure of Tang, Seo or Matsuo.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brett A. Crouse whose telephone number is (571)-272-6494. The examiner can normally be reached on Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, D. Lawrence Tarazano can be reached on 571-272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/B. A. C./
Examiner, Art Unit 1794

/D. Lawrence Tarazano/
Supervisory Patent Examiner, Art Unit
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